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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/751,251	12/30/2003	Jung Sig Jun	2080-3-213	3888
35884	7590	02/22/2007	EXAMINER	
LEE, HONG, DEGERMAN, KANG & SCHMADEKA			AHN, SAM K	
801 S. FIGUEROA STREET			ART UNIT	PAPER NUMBER
12TH FLOOR			2611	
LOS ANGELES, CA 90017				
SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE		DELIVERY MODE	
3 MONTHS	02/22/2007		PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/751,251	JUN, JUNG SIG	
	Examiner	Art Unit	
	Sam K. Ahn	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 30 December 2003.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-5 is/are rejected.
- 7) Claim(s) 6-15 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 30 December 2003 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date 011805.
- 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application
- 6) Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because “Nyquist slop” as described in Fig.7 should be “Nyquist slope”. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: various parts of the specification describes as “Nyquist slop”, which should be “Nyquist slope”.

Requests applicant to further verify for any typographical/grammatical errors.

Appropriate correction is required.

Claim Objections

3. Claims 1-15 are objected to because of the following informalities:

In claims 1,10 and 13, in its respective lines, define "A/D" and "QAM".

The limitations of claims 6 and 8 equivalent to claims 10 and 13, respectively.

Therefore, a single set of claims from above should be cancelled.

Claims 2-9,11,12 and 14 directly or indirectly depend on claim 1,10 or 13.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al.

US 2003/0058967 A1 (Lin).

Regarding claim 1, Lin teaches a carrier recovery device of a digital TV receiver (see Fig.1 and note paragraphs 0002 and 0048) comprising: an A/D converter converting an analog signal to a digital signal by using a fixed frequency (14 in Fig.1 and note paragraph 0044, A/D converter clocked by a fixed frequency from

VCO); a phase splitter splitting the digital signal to a real signal and a quadrature signal (the output of the A/D converter split into two paths to 18 in Fig.1, wherein Fig.10 further illustrates that a phase splitter 154 in Fig.10 outputs I and Q or real and quadrature signals); a first complex multiplier outputting a real base band signal $i(t)$ and a quadrature base band signal $q(t)$ by performing a complex multiplying of the real and quadrature signals of the split passband and a first complex carrier outputted from a first NCO (Fig.4 further illustrating the first complex multiplier 50-56, equivalent to the multiplier 18 in Fig.1, receiving output of the A/D converter split into I and Q by the phase splitter 154 in Fig.10, and converting into baseband data, note paragraph 0046, and receiving a first complex carrier from a first NCO 72 in Fig.4, note paragraph 0068, comprising a first NCO with pilot or carrier frequency f_c); a second complex multiplier outputting Like Offset QAM signals $i'(t)$ and $q'(t)$ by performing a complex multiplying of the real and quadrature base band signals $i(t)$ and $q(t)$ and a second complex carrier outputted from a second NCO (58 in Fig.4 receiving the output of the first complex multiplier 50-56, wherein one skilled in the art would recognize that the path starting from the phase splitter as illustrated in Fig.10, all signals are in I and Q form, outputting like offset QAM signals in the output of 58 in Fig.10, note paragraph 0059 wherein VSB spectrum is considered as like offset-QAM spectrum, and note paragraph 0066, wherein the second complex multiplier 58 is to track ensure that spectrum is centered about zero, and second complex carrier of a frquency outputted from a second NCO 70 in Fig.4, note

paragraph 0068); a phase error detector detecting a phase error to a particular multiple of a fixed frequency on basis of the Like Offset QAM signals $i'(t)$ and $q'(t)$ (60 in Fig.4 outputting 6-bit phase or frequency error to correct timing); and a Loop filter filtering the phase error, and outputting the filtered phase error to the first NCO (68 in Fig.4 filtering the output of 60 and providing its output to the first NCO 72).

And although Lin teaches that the loop filter performs filtering, do not explicitly teach low-pass filtering. Lin, on the other hand, teaches that the outside loop function (which is the loop filter 68 in Fig.4, is to track the pilot signal, which is located as illustrated in Fig.6, $fs/4$). As one skilled in the art would recognize from this, there are interferences or disturbances outside the spectrum of interest (below and above the spectrum of interest in Fig.6). Furthermore, it is well-known to one skilled in the art of applying low-pass filtering, high-pass filtering or band-pass filtering in order to remove any undesirable signals in a signal spectrum. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to low-pass filtering in the loop filter 68 in fig.4 of Lin. Applicant has not disclosed that low-pass filtering by the loop filter provides an advantage, is used for a particular purpose or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with band-pass, high-pass or low-pass filtering because it removes any undesirable signal spectrum. Therefore, it would have been obvious to one

of ordinary skill in this art to modify the loop filter 68 in Fig.4 of Lin to obtain the invention as specified in the claim.

Regarding claim 2, Lin further teaches wherein the first complex carrier is in proportional to the phase error outputted from the loop filter (72 in Fig.4 receiving output based on the phase error from 60, hence one skilled in the art would recognize that the larger the phase error, larger the adjustment is made by the NCO 72, thus are proportional).

Regarding claim 3, Lin further teaches wherein the second NCO generates a frequency of the same type as an Offset QAM signal without reception of a control signal from an external (the second NCO, 70 receives an internal control signal within the receiver).

Regarding claim 4, Lin further teaches wherein the Like Offset QAM signal is an output signal of the second complex multiplier when the fixed frequency is twice a symbol clock frequency (note paragraph 0084, wherein the I and Q signals received by the phase detector 130 are sampled at twice the symbol or the symbol clock frequency, hence one skilled in the art would recognize that the like offset QAM signals outputted by 58 are sampled twice the symbol clock frequency).

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. US 2003/0058967 A1 (Lin) in view of Lane et al. US 5,648,923 (Lane).

Regarding claim 5, teaches all subject matter claimed, as applied to claim 1. And although Lin suggests that the pilot frequency of the like offset QAM signal is located in a frequency band corresponding to $\frac{1}{4}$ of the fixed frequency (see Fig.6), Lin does not explicitly teach the pilot frequency located at $\frac{1}{8}$ of the fixed frequency.

Lane teaches, in the same field of endeavor, a TV receiver receiving VSB and QAM signals, wherein the pilot frequency located at $\frac{1}{8}$ of the fixed frequency (note col.4, line 64 - col.5, line 1).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to output like offset QAM signals at $\frac{1}{8}$ of the fixed frequency.

Applicant has not disclosed that such implementation provides an advantage, is used for a particular purpose or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with $\frac{1}{4}$ of the fixed frequency because properly receives the signal in the spectrum shown in fig.6. On the other hand, one skilled in the art may decide to transmit and receive pilot signals at $\frac{1}{8}$ of the fixed frequency, as taught by Lane. Therefore, it would have been obvious to combine the teaching of Lane in the system of Lin to one of ordinary skill in this art to modify by locating the pilot frequency to be $\frac{1}{8}$ of the fixed frequency to obtain the invention as specified in the claim.

Allowable Subject Matter

6. Claims 6-9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
7. Claims 10-15 would be allowable if rewritten or amended to overcome the claim objections, set forth in this Office action..
8. The following is a statement of reasons for the indication of allowable subject matter:
present application discloses a carrier recovery system receiving a TV signal wherein the carrier recovery system comprises an analog to digital converter, a phase splitter, first and second multipliers, phase detector and a loop filter. Prior art teaches or suggests in combination of the limitations claimed. However, prior art does not explicitly teach the further limitation of wherein the phase detector comprises first and second squarers receiving I and Q output from the second multiplier, performing subtracting operation on the outputs of the first and second squarers, passband filtering the output of the subtracting operation and detecting the phase error by a Gardner phase error detector. And further, prior art does not explicitly teach the above limitation with the replacement of the first and second squarers with a first and second absolute value calculators.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Wang US 6,233,295 B1 teaches an HDTV receiver comprising a carrier recovery circuit receiving VSB and QAM signals.

Chiou US 2003/0206052 A1 teaches a digital QAM receivers comprising a carrier recovery circuit and NCO.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sam Ahn whose telephone number is (571) 272-3044. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Handwritten Signature of Sam Ahn
KTHA NHT TRAN
Primary Examiner

Sam K. Ahn
Patent Examiner

2/16/07